



To: Long Range Planning Committee
Blacksburg Planning Commission

From: Daniel McKinney, AICP
Senior Comprehensive Planner

Date: August 11, 2003
Updated August 28, 2003

Subject: Proposed Amendment to the Town's Comprehensive Plan for the Tom's Creek Gravity Sewer.

Background

Town Council adopted a motion on July 29th, 2003 directing the Planning Commission to initiate a Comprehensive Plan amendment to authorize the construction of the Tom's Creek sewer system. The current plan discusses the issue of public sewer by giving an overview of the options that were under consideration at the time the plan was written. The plan does not give specific direction as to what sewerage option is preferred because the analysis had not yet been completed. The plan states as a primary goal to 'Provide all properties within the town's service area adequate and reliable utility services that meet demand in a customer service oriented manner; and achieve these services through safe, environmentally sensitive, and cost efficient methods by partnering with state and local governments, utility franchises, and other public service entities.' Further, the plan recommends an Action Strategy to 'Begin construction of a public wastewater service in the Tom's Creek Basin as funding allows.' This strategy intentionally left the method of public sewer service open. This amendment is intended to provide more specific direction in this regard.

Each proposed section to be amended should be evaluated on three primary criteria:

- ☐ Is the proposed amendment necessary to further Town Council's intent to construct a public, gravity sewer system in the Tom's Creek Basin?
- ☐ Does each of the proposed amendments independently conform with the overall vision and intent of other sections of the plan?
- ☐ Is each of the proposed changes warranted for the main amendment request?

A text amendment is needed to clarify the intended public sewerage system for the Tom's Creek Basin. The changes in the Utility Services Chapter and other portions of the Comprehensive Plan are cited below. In addition, other passages which are relevant, but do not require amending are included in the supplement to this staff report titled 'Passages within the Comprehensive Plan Relevant to the Tom's Creek Sewer Amendment that are not Proposed to Change '.

Text amendments are suggested as follows:

UTILITY SERVICES CHAPTER

Public Wastewater System Wastewater Service Area Section

The Town of Blacksburg serves roughly 4,300 acres with sanitary sewer in the town limits (approximately 35 percent of Town). Sewer service is available to most of the land area within the corporate limits east of the Route 460 Bypass, and a few areas west of the Bypass. Several areas west of the Bypass in the Tom's Creek Basin are ~~serviced~~ *currently served* by pumping stations or septic tank submersible pumps that transfer sewer effluent back into the Stroubles Creek Basin. The remainder of the Tom's Creek Basin is *currently* unsewered along with areas on the northern end of Town bordering North Main Street and the area south of the Industrial Park within Town.

Wastewater Monitoring Section

The Town has installed one wastewater flow monitor for purposes of determining base flows during both dry and wet weather conditions, including droughts and large rainstorms. In 2003, the flow monitor was located just below Prices Fork Road and Turner Street in the West Stroubles Sowershed. At this location, the monitor has shown inadequate sewer capacities during large rainstorms. The monitor demonstrates that the sewer overflow is not only due to added development, but also inflow and infiltration in the sewershed.

Opportunities Section

- ? A Septic Tank Effluent Pumping (STEP) and Gravity (STEG) system exists in the Tom's Creek Basin as a pilot program ~~and an alternative sewer working group has researched other wastewater systems to provide operation and maintenance information for the Town. This project has provided the town with an opportunity to broaden its information to better evaluate various wastewater options, to consider costs and environmental issues, and to explore innovative systems for the Tom's Creek Basin. It also demonstrates an alternative means of sewer collection for discharge into the Tom's Creek centralized gravity sewer collection system.~~

Challenges Section

- ⌘ Sections of the older West Stroubles Creek sewer collection system and pump stations (*i.e., the North Main Street/Giles Road corridors*) are ~~stressed~~ *experiencing overflows and backups* due to age, condition, *inflow*, infiltration, and the proliferation of pump stations adding flow from outside the natural drainage area for which the system was designed. ~~In addition, some sanitary sewer backups occur due to inflow and infiltration.~~
- ◆ *Sections of the McBryde Village sewershed and University City Boulevard sewershed*

collection systems are at or over carrying capacity.

What is Changing?, Public Wastewater Area Section

Blacksburg has obtained new wastewater service areas both within Town and out of Town through negotiations with the county (See *Figure US-8*). In addition, service is provided to existing areas in Town through capital improvement and cost share projects. ~~Planning for the construction of a public wastewater service in the Tom's Creek Basin is one of the town's major wastewater projects. Council is seeking the best option taking into consideration cost, environmental impact, reliability, and feasibility. Council is carefully evaluating several options. One option would utilize alternative, decentralized sewer technologies and treatment that as recommended by the Tom's Creek Basin Wastewater Working Group. Another option is the construction of a centralized sanitary sewer trunk line with a pump station use to transport wastewater to the treatment plant. A final option is a hybrid wastewater system that combines small diameter pressure collection lines with a central pump station that also transports effluent to the treatment plant. Benefits of an alternative, decentralized system include lower collection costs, utilization of innovative technologies, and efficient on site treatment of wastewater effluent. A hybrid system would also include lower collection costs while employing innovative technology. In contrast, a centralized, gravity line option efficiently utilizes the available capacity and advanced treatment processes of the treatment plant, and will eliminate most of the town's sanitary sewer pump stations thereby reducing capacity pressure on the Stroubles Creek trunk line. Any of the above options will enable clustered, residential development, in this area of marginal septic sites, and meet the community's vision for sensitive development and the preservation of open space throughout the Tom's Creek Basin.~~

The most immediate wastewater challenge for the Town at this time is to alleviate the overburdened sanitary sewer system serving the West Stroubles, McBryde, and University City Boulevard sewersheds. The lack of sewerage service to the Tom's Creek Basin has forced all development within it either to use private septic fields or to install pumping stations that discharge into these three sewershed collection systems. The West Stroubles sewer lines were not designed to carry flows from the Tom's Creek Basin; consequently, lines are overflowing. Additionally, all sanitary sewer lines, inside or outside of these three sewersheds, receive rainwater inflow and groundwater infiltration because of their aging conditions. Inflow and infiltration coupled with the excess sewer discharges from outside areas, has caused a capacity shortage in the sanitary sewer system. The sanitary sewer flow monitor installed in the West Stroubles Sewershed confirms these conditions.

Options that Council has considered to resolve this capacity deficiency include:

- ◆ *construction of a new force main along the Route 460 bypass to offload existing pump stations currently discharging from the Tom's Creek Basin into the three burdened sewersheds;*
- ◆ *upgrading sections of the North Main and Giles sewer lines in the West Stroubles sewershed;*
- ◆ *constructing Deep Cell lagoons at the pump stations to offload sewer;*
- ◆ *constructing a centralized gravity sewer line in the Tom's Creek Basin to carry wastewater from the Tom's Creek Basin.*

In addition to resolving the existing capacity issue, Council has also considered the provision of public sewer for the Tom's Creek Basin that provides "adequate and reliable utility services ... through safe, environmentally sensitive, and cost efficient methods". Council has carefully evaluated several options taking into consideration cost, construction impacts, reliability, and feasibility. These options included a

- ? STEP/STEG hybrid collection system;*
- ? Tom's Creek sewer gravity collection system;*
- ? STEP/STEG collection to Recirculating Sand Filter System.*

The two former systems involve collecting the sewer and transporting it to the Blacksburg/VPI&SU Sanitation Authority, whereas the latter proposal would decentralize treatment facilities throughout the Basin area.

Council has identified that the Tom's Creek sewer gravity collection system is most appropriate for the Basin because it provides offloading of critical line sections of the West Stroubles Sewershed, and would serve as a main collection system for all new development in the Tom's Creek Basin. This centralized sewer system would be sized only to serve the Future Land Use prescription as contained within this plan. Other options aimed at alleviating capacity problems, however, would require an additional wastewater collection system or treatment system in the Tom's Creek Basin. In addition, the Council determined that the Tom's Creek sewer provides known operation and maintenance costs for the Town in the future as opposed to the other wastewater options.

*In 2003, Council committed to serve the Tom's Creek Basin with a public centralized gravity sewer system to both alleviate the capacity problems in the West Stroubles Sewershed and to serve the basin with a safe, reliable system for the future. Planning, design, funding, and construction of a public gravity wastewater system in the Tom's Creek Basin is the town's major wastewater project. A description of the project includes a gravity, sanitary sewer interceptor to collect wastewater and transport it to a pumping station where it is then transferred to the treatment facility. Several installed trunk lines will deliver wastewater from each of the existing pumping stations to offload the three over-capacity sewersheds. Other trunk lines will be installed to collect wastewater from new development in the Basin, to the interceptor below. This option will enable clustered, residential development in an area of marginal septic sites, to meet the community's vision for sensitive development and the preservation of open space throughout the Tom's Creek Basin. As proposed on the future land use map, the Tom's Creek Basin development **maximum** build-out is one unit per acre. The Tom's Creek sewer will be designed to accommodate this density **and no more**. The map shown is one possible build-out scenario that would preserve over 50 percent of the land as open space, cluster development, and efficiently utilize the public wastewater system (See **Figure US-11a**). Tom's Creek gravity sewer will alleviate over-capacity sewer lines in the West Stroubles Creek Sewershed and does not prohibit the use of STEP or STEG wastewater systems as an option for new development in Tom's Creek Basin as it develops. ~~The following analysis is one possible build-out scenario that would preserve over 50 percent of the land as open space, cluster development, and efficiently utilize any of the above public wastewater systems (See Figure US-11).~~*

*Figure US-11b shows the concept route of the Tom's Creek central sewer. The pump stations at Shenandoah I & II, Brookfield, Shawnee, Sturbridge, Westover Hills, and Karr heights will no longer be necessary because wastewater will be transported by gravity lines through the Tom's Creek Basin, rather than pumped into the West Stroubles Sewershed. To alleviate sewer capacity problems in the West Stroubles, McBryde Village, and University City Boulevard sewer systems, the priority sewer line trunks will need to be constructed (as shown in orange on **Figure US-11b**. These include the Tom's Creek Pumping Station, Tom's Creek Force Main, Tom's Creek Connector, Tom's Creek Interceptor, Cricketts Court Trunk, Karr Heights Trunk, and the Shawnee Trunk. In order to offload the remaining pumping stations, the Sturbridge, Brown/Westover, and Shenandoah trunk-lines would be constructed.*

Current System Upgrade

Programs to evaluate and correct excessive inflow and infiltration into the sanitary sewer system include a root control maintenance program and the replacement or lining of aged or damaged pipes. Inflow and infiltration are monitored through the use of a *flow monitor*, camera, smoke testing, and dye testing. Lines that are identified as having excessive inflow and infiltration are replaced or lined using innovative technologies such as in-situ form lining. Town staff works with homeowners to develop alternative discharge points for roof drains, sump pumps, and other inappropriate connections that impact the system's limited capacity. The existing sanitary sewer lines in the Stroubles Creek sewershed ~~will need to be offloaded is not achieved~~ from the Tom's Creek sewershed.

Action Strategies,

within 5 years Section

- Evaluate decentralized sewer technologies, gravity sanitary sewer systems, and a hybrid system utilizing the STEP method to determine the most effective wastewater service and funding option for the Tom's Creek Basin. (*Completed July, 2003*).
- ~~Consider implementation, monitoring, and maintenance of a decentralized wastewater system.~~
- *Document existing environmental conditions in Tom's Creek prior to the construction of the central sewer system to provide baseline information on the Creek's condition.*
- *Complete the design and construction of the Tom's Creek centralized gravity sewer system per **Figure US-11b**. This centralized sewer system would be sized only to serve the Future Land Use prescription as contained within this plan.*
- *Restore the riparian areas damaged during the construction of the Tom's Creek Central Sewer System.*
- Replace and upgrade with current technology the Forest Hills, Murphy, and ~~Shenandoah pump stations along with the Givens pump stations generator.~~
- *Reduce the flows within the Stroubles Creek sanitary sewer system by off-loading wastewater loads to the Tom's Creek sewer system. Offload, replace, or upgrade sections of gravity sewer lines in the Stroubles Creek sewershed identified as being at capacity in the CIP.*

SHAPING THE FUTURE CHAPTER

Conservation of Open Space Section

~~Either A public centralized gravity sewer system or regional alternative wastewater treatment facilities will be constructed in the [Tom's Creek] area to support the development clusters and maintain the operational effectiveness of the central town sewer system by eliminating pump stations that stress that system. Until the sewer line is completed development in the Tom's Creek area in the near term will continue to be limited by available septic sites until a public sewerage system is constructed. However, it is anticipated that this constraint will reduce as sewage disposal technology advances and systems can be located where historically the soils would not support septic.~~

The Tom's Creek Basin, which spans over four neighborhood planning areas, contains most of the undeveloped area within the town. If by 2046 this area was developed at the **current** maximum density of one unit per acre under the clustering provisions of the ordinance, this area could support approximately 7,500 new residents or 42% of the population growth anticipated through 2046.

COMMUNITY DESIGN CHAPTER

What is Changing Section

The town ~~has is~~ investigated the most effective public wastewater treatment system to install in the Tom's Creek Basin and has determined that a public centralized gravity sewer system sized only to serve the Future Land Use prescription contained within this plan is the best option. The installation of ~~this a public wastewater~~ system will result in increased development pressures in this area of Town. In addition, it will provide an opportunity for different styles of development, *as well as allow for the replacement of private septic/drain fields which typically have higher failure rates than public wastewater systems.*

NATURAL ENVIRONMENT CHAPTER

Background, *Land Resources Section*

Erosion and sedimentation, groundwater pollution, flooding, drainage problems, failed septic systems, and construction problems are all possible when soil characteristics are not considered when developing land. Blacksburg's topography includes slopes greater than seven percent, which means these areas are susceptible to soil erosion. These areas of high erosion potential do not exist in large blocks of land, but instead they are interspersed throughout Town. Also, few unsewered areas of the town are well suited for septic system drainfields. This suggests that wastewater handling may be a constraint for large-scale developments in the Tom's Creek Basin watershed *until unless* either centralized sewer is extended to the area or a decentralized system –

~~divided into treatment clusters according to the topography and other physical constraints – is approved by the town and used by developers. The preferred decentralized system, per the Tom's Creek Working Group, would be a Septic Tank Effluent Gravity (STEG) sewer with a community sandfilter, publicly operated and maintained. Several different decentralized sewerage options are available and could serve from ten to twenty clusters. They would average service for 100-300 houses with each residence containing septic tank effluent gravity sewer (STEG) or septic tank effluent pressure (STEP) collection systems.~~

NORTHWEST SECTOR CHAPTER

Critical Issues Section

Public wastewater systems are not provided to the majority of the residents in the sector. Sewer service is only provided to the Glade-Westover neighborhood. Capacity in the town's sewer system is limited and few new connections can be accommodated without the construction of a centralized sewer system in the Tom's Creek Basin. Construction of sewer to serve this area was a condition of the 1973 annexation by the town. The town ~~has~~ *is* researched ~~ing~~ the feasibility of decentralized wastewater treatment systems as an alternative to a centralized system. There are several systems that may effectively serve the sector but lower installation costs may be offset by higher maintenance costs over time. The town ~~will implement a public wastewater system once has completed a final cost/benefit comparison study and determined that a central gravity sewer system sized only to serve the Future Land Use prescription as contained within this plan is the preferred option has been completed.~~ When a the public gravity sewerage system is constructed, proper land use regulations must remain in place to preserve the community's preferred development pattern.

Conclusion

In order for the comprehensive plan to be amended, one or more of the following criteria must be met:

- The request must be a creative idea or concept that will benefit the community and that was unforeseen during the planning process for the comprehensive plan.
- The subject property or concept was misinterpreted or overlooked in the comprehensive plan.
- Conditions have changed substantially since the last comprehensive plan update necessitating a change, such as changes in surrounding land use or economic conditions.
- An undue hardship exists substantially limiting the use of the subject property.
- The amendment will effectively aid in the implementation of the vision or goals of the comprehensive plan.

This amendment request is needed to clarify the intended vision of Town Council to more effectively aid in the implementation of the vision and goals of the plan to provide for a

public wastewater system for the Basin. The proposed amendment should remain consistent with the other vision and goals of the Comprehensive Plan.